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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/040,963  | 01/05/2002  | Steven Teig          | SPLX.P0023          | 1720             |
| 23349   | 7590        | 05/03/2004           | EXAMINER            |                  |
| STATTLER JOHANSEN & ADELI<br>P O BOX 51860<br>PALO ALTO, CA 94303 |             |                      | SIEK, VUTHE         |                  |
|   |             |                      | ART UNIT            | PAPER NUMBER     |
|   |             |                      | 2825                |                  |

DATE MAILED: 05/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |           |
|------------------------------|------------------------|---------------------|-----------|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |           |
|                              | 10/040,963             | TEIG ET AL.         |           |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |           |
|                              | Vuthe Siek             | 2825                | <i>aw</i> |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 2/25/04.
- 2a) ☒ This action is **FINAL**.      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 27,29-57 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 42-43 is/are allowed.
- 6) ☒ Claim(s) 27,29-31,40-53 is/are rejected.
- 7) ☒ Claim(s) 32-39,54-57 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>11/10/03, 11/05/03, 10/27/03, 9/26/03, 9/15/03, 5/11/03</u>               | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

1. This office action is in response to application 10/040,963 and amendment filed on 2/25/2004. Claims 27 and 29-57 remain pending in the application.

#### ***Specification***

2. The disclosure is objected to because of the following informalities: continuing data on page one of the specification claiming benefit of 60/314,580 08/23/2000 should be **08/23/2001**.

The abstract of the disclosure is objected to because phrase "some embodiments provide..." does not specifically describe the invention. Correction is required. See MPEP § 608.01(b). Appropriate correction is required.

#### ***Claim Objections***

3. Claims 27, 41 and 50 are objected to because of the following informalities: phrase "a threshold value" should be specifically defined as what threshold value is referred to because numerous threshold values found. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 27, 29-31, 40, 41, 44 and 50-53 are rejected under 35 U.S.C. 102(b) as being anticipated by DEGUCHI et al., "Timing-Driven Hierarchical Global Routing with Wire-Sizing and Buffer-Insertion for VLSI with Multi-Routing-Layer," IEEE, Jan. 25-28, 2000, pp. 99-104.
6. As to claims 27, 41 and 50, DEGUCHI et al. teach a method for hierarchical routing nets within a region of an integrated circuit (IC) layout by considering both timing and routing congestion constraints. The routing method comprising dividing a region into 4x4 regions. Each region at certain level is divided into 4x4 sub regions recursively. Next, perform routing nets in each 4x4 region by considering both timing constraints and routing congestion constraints (threshold value). After 4x4 routing, divide the routing area hierarchically and set terminals among sub regions in next hierarchy level. Then the routing nets repeat area routing and hierarchical decomposition until a predetermined level (see pages 99-103).
7. As to claims 29-31 and 51-53, DEGUCHI et al. teach hierarchical routing nets method based on a multi-layer routing model (possible routing pattern) including determining suitable wire width for each net so as to satisfy the timing and routing congestion constraints, where the routing congestion or routing capacity including blockages of the paths can be calculated (page 99-100).
8. As to claim 40, DEGUCHI et al. teach the routes of nets in each hierarchical level are determined by solving a linear programming problem considering timing and routing congestion constraints (pages 99-100).

9. As to claim 44, DEGUCHI et al. teach a hierarchical routing method comprising dividing a region into 4x4 regions. Each region at certain level is divided into 4x4 sub regions recursively. Next, perform routing nets in each 4x4 region considering both timing constraints and routing congestion constraints (threshold value). After 4x4 routing, divide the routing area hierarchically and set terminals among sub regions in next hierarchy level. Then the routing nets repeat area routing and hierarchical decomposition until a predetermined level (see pages 99-103).

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 45-49 rejected under 35 U.S.C. 103(a) as being unpatentable over DEGUCHI et al., "Timing-Driven Hierarchical Global Routing with Wire-Sizing and Buffer-Insertion for VLSI with Multi-Routing-Layer," IEEE, Jan. 25-28, 2000, pp. 99-104 in view of Das et al., "Channel Routing in Manhattan-Diagonal Model," IEEE, Jan. 1996, pp. 43-48.

12. As to claims 45-49, DEGUCHI et al. do teach some paths are diagonal and Manhattan path (Figs. 4, 6). DEGUCHI et al. also suggest one of goal of hierarchical routing nets based on timing and routing congestion constraints is to reduce routing congestion. DEGUCHI et al. do not explicitly teach Manhattan-Diagonal paths. Das et

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al. teach such limitations. Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to have included Manhattan-diagonal paths as claimed in the hierarchical routing nets based on timing and routing congestion constraints as taught by DEGUCHI et al. because Manhattan-diagonal paths would better provide wiring minimization during the routing process, thereby it would improve timing delay to meet timing constraints and reduce routing congestion.

***Allowable Subject Matter***

13. Claims 32-34; 35-37; 38; 39; 54; 55; 56 and 57 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and written to overcome the above claim objections.

14. Claim 42-43 are allowed over the prior art of record.

***Remarks***

15. Applicant(s) argued that Andreev routing is not based the congestion calculation. DEGUCHI et al. clearly teach the claimed invention as described in the above rejection (see pages 99-103).

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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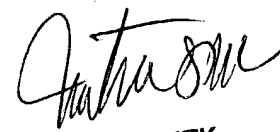
**Conclusion**

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vuthe Siek whose telephone number is (571) 272-1906. The examiner can normally be reached on M-F (6:30-4:00) 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571) 272-1907. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

Vuthe Siek  
April 20, 2004

  
VUTHE SIEK  
PRIMARY EXAMINER